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DEMOLITIONS of the SAVANNAH RIVER SITE'S CONCENTRATOR and FINISHING FACILITIES

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OBJECTIVE

The Savannah River Site (SRS) has produced Special Nuclear Materials (SNMs) starting in the early 1950's to the mid 1970's for the Atomic Energy Commission (AEC) and from the mid 1970's to the present for the Department of Energy (DOE). In that time, over 1,000 facilities have been built in the sixteen (16) operational areas of the eight hundred (800) square kilometer site.

Over the years, many of the facilities have been dispositioned by the DOE as inactive. In FY-03, DOE identified two hundred and forty-seven (247) (inactive or soon to be inactive) facilities that required demolition. Demolition work was scheduled to start in FY-04 and be completed in the first quarter of FY-07. Two-hundred and thirty-nine (239) of these facilities have been demolished employing Routine demolition techniques.

This presentation reviews and discusses two (2) of the eight (8) Non-Routine demolitions Facilities, 420-D "The Concentrator Facility," and 421-D "The Finishing Facility."

WORK DESCRIPTION

Two hundred and thirty-nine (239) demolitions at SRS were performed employing the same basic techniques, defined as "Routine". A hydraulic back hoe fitted with a shearing attachment (the shear) rips any facility less than forty (40) ft. high into a pile of jagged rubble. The shear then size reduces the rubble to fit into waste disposal containers (8 ft. wide X 6 ft. high X 30 ft. long). The rubble is then loaded into waste containers utilizing the shear, a hydraulic back hoe with a grappling attachment and/or a rubber-tired front end loader. The waste containers are then removed for recycling or disposal.

Any demolition applying other techniques is defined at SRS as "Non-Routine" demolition and requires a facility specific demolition plan. There have been eight (8) non-routine demolitions performed at SRS to date. Seven (7) of the eight (8) facilities (305-A, 777-10A, 420-D, 421-D, 247-7F, 285-F & 285-H) had building heights that exceeded the reach of the shear employed at SRS. The seventh facility was located on the roof of an operating facility, Building 221-F, and the roof would not support the weight of the heavy equipment utilized for routine demolition.

Several distinct demolition methods were developed for the seven facilities. Facilities 420-D & 421-D were demolished by attaching rigging from the structural steel building frame to bulldozers and toppling the facility over. Calculations were performed to:

1. Locate the rigging attachment points to the structures.
2. Determine the pulling force the bulldozers would be required to provide in order to buckle the structural steel and topple the facilities.
3. Size the rigging equipment.

Additional safety measures implemented included barricading off an area around the facilities one and a half (1½) times the structures' height as well as reinforcing the bulldozers' cabs with additional steel plates.

RESULTS

The 420-D Concentrator facility purified heavy water from SRS reactors and offsite sources. 420-D, built in 1954, is a 14,000 square foot open frame structure with enclosed equipment and control rooms. The twelve (12) distillation towers shown in Figure 1 were removed during deactivation.



Figure 1 – Concentrator Facility

The 421-D Finishing facility was an 8,000 square foot steel framed structure built in 1954 providing a location for the heavy water pilot plant and also housed part of a system for purifying heavy water.



Figure 2 - Finishing Facility

Facilities 420-D & 421-D were demolished by attaching rigging from the structural steel building frame to bulldozers and toppling the facilities over. This method was chosen for two main reasons:

- A. The rigging required to topple the facilities' structural steel frames did not exceed 1¼ in. wire ropes.
- B. There was ample area for the facilities to topple into.

Alternative demolition methods considered for facilities 420-D & 421-D were:

- A. Wrecking ball; however, the facilities were contaminated, and concerns over controlling the demolition debris were raised.
- B. High reach shear; however, the square footage of the facilities did not justify leasing and assembling a high reach shear.

Both facilities were successfully demolished utilizing the toppling method. We learned that the yield strength of the steel is much greater than the 36 KSI the manufacturers guarantee. Fortunately, we had oversized the wire ropes, and they were able to withstand the increased pull required to topple the building. The buildings were toppled over with minor revisions to our demolition plan on schedule and within budget.

Discussions & Conclusions

Facilities 420-D & 421-D were toppled by attaching rigging from the structural steel building frame to bulldozers and toppling the facilities over. The greatest advantage of this method is that it employs equipment that is on hand at SRS, saving time on locating and leasing offsite equipment as well as operator training. In addition, although the toppled structure does not land in the original facilities footprint, it does land in a contained area that is easily barricaded to prevent access during the operation.

There are several disadvantages. First, there must be adequate area for the structure to topple into. Also if the wire rope size required to topple the structure is larger than two (2) in., the ropes become extremely difficult to work with. Lastly, the yield strength of steel members is guaranteed by the manufacturer as a minimum strength, so its ultimate strength is unknown. This requires extremely conservative specifications sizing the bulldozers and any rigging equipment employed.

Two hundred and forty-seven (247) facilities have been successfully demolished at SRS utilizing four (4) different demolition techniques. The routine method employed on the vast majority of facilities has been extremely successful and should be applied whenever possible. Because of their height, the 420-D & 421-D facilities required developing a new (to SRS) demolition method. This technique of toppling the structures with a bulldozer and implementing additional safety measures provided a successful, safe, and cost efficient demolition method. This method should be employed in the future on any steel or wood framed structures that are over forty (40) ft. high that have ample space around them.